

DEFINITIONS AND SPECIAL INSTRUCTIONS

1. Scope of survey

This survey covers manufacturers of fluid power products — devices that use fluid (gas or liquid) as a medium for transferring power, including pneumatic (air) motors. Exclude plumbing and heating valves and specialties (3329191); metal fittings, flanges, and unions for piping systems (3329193); automatic regulating and control valves (332911F); solenoid-operated valves not used in a fluid power transfer system (332911H); nuclear valves (332911D); and other industrial valves (3329111-332911B). Also, exclude non-fluid power industrial pumps and pumping equipment as well as pumps for farm and home use (3339111-3339115); air and gas compressors (3339121); constant speed drivers (3336123 and 3336127); complete hydrostatic transmissions used for motor vehicles (3363501); pneumatic and hydraulic hose without fittings (3262208); and gaskets, packing, and sealing devices (339991).

2. Figures to be reported

Companies with more than one establishment manufacturing the products covered by this survey are requested to complete a separate report form for each location. If you have not received a separate form for each of your establishments, please call the contact listed on the report form or write to the U.S. Census Bureau for additional forms.

a. Resales

Products bought and resold without further manufacture should not be included in shipments (this is regardless of whether or not they were imported).

b. Quantity and value of shipments

The figures on quantity and value of shipments should include the physical shipments of all products sold, transferred to other establishments within your company, or shipped on consignment, whether for domestic or export sale. The value represents the net sales price, f.o.b. plant, to the customer or branch to which the products are shipped, net of discounts, allowances, freight charges, and returns. Shipments to your own branches should be assigned the same value as comparable sales to unaffiliated customers; i.e., the value includes any appropriate allocation of company overhead and profit. Do not combine product lines. Quantity should be reported in number of units (unless otherwise noted); value, in thousands of dollars.

Note: When reporting quantity and value figures for hydrostatic transmissions or power units, report the quantity and value for the pumps, motors, valves, and prime mover separately in the appropriate categories. The value of components common to both the pump and motor in a hydrostatic transmission or the pump and prime mover in a power unit should be allocated to the pump and motor or the pump and prime mover in the appropriate ratio.

b. Columnar structure of report

When entering your figures on the original report, please be sure to report the information in the correct columns.

Column 1 — Total Quantity (Units)

Column 2 — Total Shipments Value

Column 3 — Mobile Shipments Quantity (Units)

Column 4 — Mobile Shipments Value

Column 5 — Industrial Shipments Quantity (Units)

Column 6 — Industrial Shipments Value

Section I — Report all fluid power valves, including parts.

Section II — Report all fluid power fittings and assemblies.

Section III — Report all fluid power filters, including parts.

Section IV — Report all fluid power cylinders, rotary actuators, accumulators, cushions, and non-vehicular shock absorbers, including parts.

Section V — Report all fluid power pumps and motors, including parts.

3. Definitions

Accumulators (hydraulic only) — Devices that store hydraulic fluid under pressure as a source of fluid power.

Actuators — Devices that convert fluid power into linear or rotary mechanical force. Linear types are typically referred to as cylinders. Rotary types are referred to as rotary actuators and motors. Motors have shafts that rotate continuously in the same direction. Rotary actuator shafts do not rotate continuously. Typically, the shafts rotate a certain number of degrees before rotating in the opposite direction to their point of origin.

3. Definitions — Continued

Air dryer — A device for reducing the moisture vapor content of the compressed air in a pneumatic system

Assembly — A length of hose and/or tubing that fittings have been attached to.

Cushion — A device that provides controlled resistance to non-linear motion.

Cylinder, electrohydraulic — A hydraulic, linear actuator that produces a continuously variable mechanical output, as a function of a continuously variable electronic input signal (voltage or current).

Cylinder, mill type — A linear actuator that has circular flanges welded to the cylinder barrel ends. This type of cylinder is used in severe duty applications like the steel mills from which it derived its name.

Cylinder, rodless (shuttle) — A linear actuator with a rod that never leaves its case, that is sealed lengthwise. Typically used in position control applications.

Cylinder, telescoping — A linear actuator with nested tubular rod segments that provide a long working stroke in a short retracted envelope.

Cylinder, threaded/weld fused combination — A linear actuator with one threaded end and one weld fused end.

Cylinder, tie rod — A linear actuator with head and cap end closures that are secured by tie rods.

Filter (filter assembly) — A device whose primary function is the retention of insoluble contaminants in a fluid by a porous media.

Filter element — That part of a filter that retains contaminants. Some elements are permanent (reusable or cleanable) and others are disposable (nonreusable). Disposable elements must eventually be replaced.

Fittings — Devices used to connect hoses and tubing to components (valves, cylinders, motors, pumps) of a fluid power system. They are constructed from metal or plastic, and are sometimes referred to as connectors or couplings.

Gerotor/Gerolor — A special type of internal gear motor where the internal gear is always in sliding contact with the external gear.

Industrial — Those products that are sold to users who incorporate them into stationary machines for industrial automation, or similar purposes.

Hydrostatic transmission — A device that combines a hydraulic pump with a hydraulic motor. Quantity and value of pumps and motors sold together as transmissions should be reported separately in the relevant pump and motor categories listed in the Reference List.

Intensifier — Devices driven by a low pressure fluid to produce fluid at a higher pressure.

Lubricator — A device that adds controlled or metered amounts of lubricant into a pneumatic system.

Manifold (manifold assembly) — A fluid conductor that can provide multiple connection ports. In a fluid power system, manifolds are typically used as housings for cartridge valves.

Mobile — Those products that are sold to end users who incorporate them into mobile machinery (on wheels or tracks) that is not used in a factory setting for the production of other equipment.

Motor — A device that transforms fluid power into rotary mechanical force. Motors can be hydraulic or pneumatic.

Motor, axial piston — A motor with several parallel pistons arranged around a common axis.

Motor, external gear — A motor that has only external gears and no internal gear.

Motor, internal gear — A motor with an internal gear that meshes with one or more external gears. See also gerotor/gerolor.

Motor, radial piston — A motor with several pistons arranged to operate radially.

Motor, vane — A motor with multiple vanes that cause rotation of internal member when under pressure.

Power unit — A device that combines a hydraulic pump with a prime mover (usually an electric motor). As is done for hydrostatic transmissions, the quantity and value of the pumps and prime movers should be reported separately in the relevant categories listed in the Reference List.

Pump, axial piston — A reciprocating pump with several parallel pistons arranged around a common axis.

3. Definitions — Continued

Pump, external gear — A rotary pump that has only external gears, and no internal gear.

Pump, internal gear — A rotary pump that has an internal gear in engagement with one or more external gears. An internal gear pump generally has external gears that rotate on a fixed axis. A gerotor pump differs from other internal gear types in that its internal gear is always in sliding contact with the external gear.

Pump, radial piston — A reciprocating pump with several pistons arranged radially within the pump chamber.

Pump, reciprocating — A pump that uses pistons to create a partial vacuum to draw hydraulic fluid through the pump inlet. The return strokes of the pistons unseat outlet check valves and force the fluid through the pump outlet.

Pump, rotary — A pump that uses gears or vanes to cause rotary motion that moves hydraulic fluid from the pump inlet to the pump outlet.

Pump, vane — A rotary pump with multiple vanes within a supporting rotor.

Reservoir, hydraulic — A container for storage of hydraulic fluid under pressure.

Valves, cartridge — Valves with working parts contained in a cylindrical body. The body must be inserted into a housing (usually a manifold) for use. Ports through the body of the valve align with ports in the housing.

Valves, electrohydraulic — Valves that use continuously variable electronic input (voltage or current) to produce a continuously variable hydraulic output.

Valves, manually operated — Valves actuated by means of a hand lever, or other manual energizing device.

Valves, mechanical — Valves that are actuated by cams, levers, rollers, screws, springs, stems or other mechanical energizing devices.

Valves, relief — Direct acting or pilot operated valves that are used to prevent a hydraulic system from exceeding its maximum pressure limits.

Valves, remote pilot — Pilot operated valves that are controlled remotely through the use of air pressure.

Valves, solenoid — Valves that are operated by a solenoid.

4. Comparability

If you also report in the Annual Survey of Manufactures (Form MA-10000), the sum of values for item codes shown in column (a) should correspond to the dollar values reported under product class codes indicated in column (b) below:

Current Industrial Reports (Form MA333N) Item codes (a)	Annual Survey of Manufactures Product class codes (b)
1201 through 1219	3329125
1221 through 1249	3329127
1251 through 1269	3329129
1271 through 1279	332912B
1281 through 1289	3329121
1291	3329123
1293, 1295	332912D
2201 through 2209	332912H
2211 through 2221	332912J
2241 through 2251	332912L
2261, 2263	332912N
2271 through 2277	332912F
3301 through 3309	3339993
3311 through 3323	3339994
3325, 3327	3339996
3341 through 3347	3339998 3339998
4501 through 4519	3339951
4601 through 4619	3339953
4841 through 4847, 4893	3339955
4851 through 4877	3339957
5504 through 5517	3339961
5534 through 5538	3339963
5545 through 5571	3339965
5581 through 5589	3339967
5591 through 5597	3339969

REFERENCE LIST

FORM **MA333N**

FLUID POWER PRODUCTS (INCLUDING AEROSPACE) (SHIPMENTS)

Product code	Item code	Item description
Section I — FLUID POWER VALVES (hydraulic and pneumatic valves and parts)		
*(Report quantity in number of units)		
3329125		NONAEROSPACE TYPE HYDRAULIC DIRECTIONAL CONTROL VALVES, excluding cartridge, stack, logic and electrohydraulic types
		Manual:
3329125110	1201	3- & 4-way monoblock*
3329125120	1205	3- & 4-way sectional*
3329125130	1209	Other manual*
		Solenoid:
3329125140	1211	2-way types*
3329125150	1215	3- & 4-way types*
3329125160	1219	Other directional control*
3329127		NONAEROSPACE TYPE HYDRAULIC VALVES (EXCEPT DIRECTIONAL CONTROL)
		Pressure control:
3329127110	1221	Relief valves*
3329127120	1225	Other, including load sensing and manual types*
		Flow control:
3329127130	1231	Manual types*
3329127140	1235	Other flow control types*
3329127150	1239	Cartridge valves (all types)*
		Electrohydraulic valves:
3329127160	1241	Pilot operated, torque motor servovalves*
3329127170	1243	Other types, including proportional*
3329127180	1249	Other nonaerospace type hydraulic valves, including stack and logic*
3329129		NONAEROSPACE TYPE PNEUMATIC DIRECTIONAL CONTROL VALVES
3329129110	1251	Manual*
		Solenoid:
3329129120	1253	Under 1/8" port diameter*
		1/8" up to and including 1/4" port diameter:
3329129130	1255	3-way types*
3329129140	1257	4-way types*
		Over 1/4" port diameter:
3329129150	1265	3-way types*
3329129160	1267	4-way types*
3329129170	1268	All other solenoid*
3329129180	1269	Mechanical, remote pilot and all other types*
332912B		NONAEROSPACE TYPE PNEUMATIC VALVES (EXCEPT DIRECTIONAL CONTROL)
332912B110	1271	Filter-regulator combination units, integral types*
332912B120	1273	Other FRs and filter-regulator-lubricator combo units*
332912B130	1275	Regulators sold separately*
332912B140	1277	Flow control valves*
332912B150	1279	Check, shuttle, exhaust, needle and all other types*

REFERENCE LIST — Continued

FORM MA333N		
FLUID POWER PRODUCTS (INCLUDING AEROSPACE) (SHIPMENTS)		
Product code	Item code	Item description
3329121		Section I — FLUID POWER VALVES (hydraulic and pneumatic valves and parts) — Continued *(Report quantity in number of units) AEROSPACE TYPE HYDRAULIC FLUID POWER VALVES 2-, 3-, and 4-way directional control valves: Manually or mechanically operated* Solenoid operated* Motor operated* Electrohydraulic servovalves* Flow, pressure, and other types of hydraulic valves*
3329121110 3329121120 3329121130 3329121140 3329121150	1281 1283 1285 1287 1289	
3329123		AEROSPACE TYPE PNEUMATIC FLUID POWER VALVES
3329123110	1291	Pneumatic valves (all types)*
332912D		PARTS FOR FLUID POWER VALVES
332912D110 332912D120	1293 1295	Parts for nonaerospace type hydraulic and pneumatic valves, sold separately Parts for aerospace type hydraulic and pneumatic valves, sold separately
332912H		Section II — FLUID POWER FITTINGS AND ASSEMBLIES (fittings for and assemblies of tubing and hose used in fluid power transfer systems) NONAEROSPACE TYPE FLARED (METAL) FITTINGS AND COUPLINGS FOR, AND ASSEMBLIES OF TUBING USED IN FLUID POWER TRANSFER SYSTEMS Flared fittings: Brass and bronze (SAE 45 degrees and 37 degrees) Carbon steel (JIC 37 degrees) Other, including alloy steel Assemblies of tubing Assemblies of tubing and hose
332912H110 332912H120 332912H130 332912H140 332912H150	2201 2203 2205 2207 2209	
332912J		NONAEROSPACE TYPE FLARELESS FITTINGS AND COUPLINGS, INCLUDING NONMETAL FITTINGS, USED IN FLUID POWER TRANSFER SYSTEMS
332912J110 332912J120 332912J130 332912J140 332912J150	2211 2213 2215 2217 2221	Metal types: Brass and bronze Carbon steel Stainless steel Other, including alloy steel Nonmetal fittings, including plastic
332912L		NONAEROSPACE TYPE HYDRAULIC AND PNEUMATIC FITTINGS AND COUPLINGS FOR HOSE, AND MANIFOLDS
332912L110 332912L120 332912L130 332912L140 332912L150 332912L160	2241 2243 2245 2247 2249 2251	Permanent hose end fittings (crimped and swaged) Hydraulic and pneumatic reusable end fittings Hydraulic quick connect and disconnect couplings Pneumatic quick connect and disconnect couplings Manifolds and manifold assemblies for fluid power systems All other, including steel adaptor, swivel, rotating, and extension fittings

REFERENCE LIST — Continued

FORM MA333N		
FLUID POWER PRODUCTS (INCLUDING AEROSPACE) (SHIPMENTS)		
Product code	Item code	Item description
332912N		Section II — FLUID POWER FITTINGS AND ASSEMBLIES (fittings for and assemblies of tubing and hose used in fluid power transfer systems) — Continued
		NONAEROSPACE TYPE HYDRAULIC AND PNEUMATIC ASSEMBLIES OF HOSE
332912N110	2261	Assemblies with permanent end fittings
332912N120	2263	Assemblies with reusable end fittings
332912F		AEROSPACE TYPE HYDRAULIC AND PNEUMATIC HOSE OR TUBE END FITTINGS AND ASSEMBLIES AND MANIFOLDS
332912F110	2271	Assemblies of hose and/or tubing
332912F120	2273	Quick connect, rotating, swivel, and extension fittings
332912F130	2275	Manifolds for aerospace hydraulic systems
332912F140	2277	Aerospace hose and tube fittings n.e.c.
		Section III — FILTERS FOR HYDRAULIC AND PNEUMATIC FLUID POWER SYSTEMS
		*(Report quantity in number of units)
3339993		NONAEROSPACE TYPE FILTERS FOR HYDRAULIC FLUID POWER SYSTEMS
		Hydraulic fluid filter assemblies, with or without filter element installed:
3339993110	3301	Low pressure (below 301 psi)*
3339993120	3302	Medium pressure (301 - 2,999 psi)*
3339993130	3304	High pressure (3,000 psi and above)*
		Filter replacement elements:
3339993140	3305	Reusable (cleanable) type*
3339993150	3307	Nonreusable type*
3339993160	3309	Strainers and separators, filter parts, and accessories
3339994		NONAEROSPACE TYPE FILTERS FOR PNEUMATIC FLUID POWER SYSTEMS
		Air supply filter assemblies and filter replacement elements, excluding those shipped as part of a FR or FRL combo unit:
3339994110	3311	Coalescing types, including elements sold separately
3339994120	3313	Other types, including elements sold separately
3339994130	3323	Air exhaust mufflers, diffusers, filter parts and air preparation accessories
3339996		AEROSPACE TYPE HYDRAULIC AND PNEUMATIC FILTERS
3339996110	3325	Hydraulic
3339996120	3327	Pneumatic
		COMPRESSED AIR AND GAS DRYERS, AND LUBRICATORS
		Compressed air and gas dryers:
3339998872	3341	Refrigerated dryers*
3339998874	3343	Desiccant dryers*
3339998879	3346	Other compressed air and gas dryers*
3339998880	3347	Lubricators for pneumatic systems, sold separately*

REFERENCE LIST — Continued

FORM MA333N		
FLUID POWER PRODUCTS (INCLUDING AEROSPACE) (SHIPMENTS)		
Product code	Item code	Item description
		Section IV — HYDRAULIC AND PNEUMATIC CYLINDERS, ACTUATORS, ACCUMULATORS, CUSHIONS, NONVEHICULAR SHOCK ABSORBERS, AND PARTS
		*(Report quantity in number of units)
3339951		NONAEROSPACE TYPE HYDRAULIC FLUID POWER CYLINDERS AND ACTUATORS, LINEAR AND ROTARY
		Hydraulic cylinders, excluding electrohydraulic:
		Tie-rod types:
		Standard NFPA and JIC tie-rod types:
3339951110	4501	Less than 1500 psi*
3339951120	4503	1500 to 3000 psi*
3339951130	4505	Greater than 3000 psi*
3339951140	4507	Other tie-rod types*
3339951150	4509	Threaded/weld fused combination*
3339951160	4511	Telescoping*
3339951170	4513	Mill type*
3339951180	4515	Other, including those threaded at both ends*
3339951190	4517	Electrohydraulic types*
33399511A0	4519	Hydraulic rotary actuators*
3339953		NONAEROSPACE TYPE PNEUMATIC FLUID POWER CYLINDERS AND ACTUATORS, LINEAR AND ROTARY
		NFPA interchangeable cylinders:
3339953110	4601	Steel*
		Aluminum:
3339953120	4603	Less than 1½" bore size*
3339953130	4605	1½" bore size and over*
3339953140	4607	Rodless cylinders*
		Other pneumatic cylinders:
3339953150	4609	Less than 1½" bore size*
3339953160	4611	1½" bore size and over*
3339953170	4619	Pneumatic rotary actuators*
3339955		PARTS FOR NONAEROSPACE TYPE HYDRAULIC AND PNEUMATIC FLUID POWER CYLINDERS, ACTUATORS, AND RELATED ITEMS N.E.C.
3339955110	4841	Accumulators (bladder, piston, and other types)*
3339955120	4843	Shock absorbers, not for vehicle suspension, and cushions (hydraulic and pneumatic)*
3339955130	4845	Reservoirs, intensifiers, and other devices for fluid energy absorption and/or storage*
3339955140	4847	Parts for nonaerospace type hydraulic and pneumatic cylinders, actuators, accumulators, cushions, and nonvehicular shock absorbers, sold separately

REFERENCE LIST — Continued

FORM MA333N		
FLUID POWER PRODUCTS (INCLUDING AEROSPACE) (SHIPMENTS)		
Product code	Item code	Item description
3339957		Section IV — HYDRAULIC AND PNEUMATIC CYLINDERS, ACTUATORS, ACCUMULATORS, CUSHIONS, NONVEHICULAR SHOCK ABSORBERS, AND PARTS — Continued *(Report quantity in number of units) AEROSPACE TYPE FLUID POWER CYLINDERS AND ACTUATORS, HYDRAULIC AND PNEUMATIC
3339957110	4851	Hydraulic servo-actuator assemblies (linear and rotary): Mechanical input*
3339957120	4853	Electrical input*
3339957130	4855	Combination input*
3339957140	4861	Hydraulic utility actuators: Linear actuators (cylinders)*
3339957150	4863	Rotary actuators (limited rotation)*
3339957160	4865	Shock absorbers, snubbers, and cushions (all types), excluding oleo strut assemblies*
3339957170	4871	Pneumatic actuators (linear and rotary)*
3339957180	4873	Accumulators (bladder, piston, and other types)*
3339957190	4875	Reservoirs, intensifiers, and other devices for fluid energy absorption and/or storage*
33399571A0	4877	Other aerospace type fluid power cylinders, rotary actuators, cushions and related items n.e.c.
3339955150	4893	Parts for aerospace type hydraulic and pneumatic cylinders, actuators, accumulators, cushions, and related items, sold separately
3339961		Section V — FLUID POWER PUMPS AND MOTORS, AND PARTS *(Report quantity in number of units) NONAEROSPACE TYPE RECIPROCATING PUMPS
3339961110	5504	Axial piston: Variable displacement types: Closed loop*
3339961120	5514	Open loop*
3339961130	5515	Fixed displacement types*
3339961140	5517	Radial piston types*
3339963		NONAEROSPACE TYPE ROTARY AND OTHER FLUID POWER PUMPS
3339963110	5534	Gear type: Internal, including gerotors*
3339963120	5535	External type*
3339963130	5536	Vane type: Fixed displacement*
3339963140	5538	Variable displacement*

REFERENCE LIST — Continued

FORM **MA333N**

FLUID POWER PRODUCTS (INCLUDING AEROSPACE) (SHIPMENTS)

Product code	Item code	Item description
3339965		Section V — FLUID POWER PUMPS AND MOTORS, AND PARTS — Continued *(Report quantity in number of units) NONAEROSPACE TYPE FLUID POWER MOTORS Hydraulic motors: Gear type: Internal, excluding gerotor types* Gerotor types* External* Vane types, fixed and variable* Radial piston types, fixed and variable* Axial piston types: Fixed displacement* Variable displacement* Pneumatic (air) motors* Prime movers shipped with pumps or sold separately
3339965120	5548	
3339965130	5550	
3339965140	5551	
3339965150	5553	
3339965160	5555	
3339965170	5557	
3339965180	5559	
3339965110	5560	
3339965190	5571	
3339967		AEROSPACE TYPE FLUID POWER PUMPS AND MOTORS Hydraulic pumps: Fixed and variable displacement types* Pump/electric motor assemblies, fixed, and variable displacement types* Other pump packages n.e.c.* Motors: Pneumatic (air) motors and motor packages* Hydraulic motors, fixed and variable displacement types* Hydraulic motor packages, including motor/gearbox, motor/valve, motor/generator, and similar combination units*
3339967110	5581	
3339967120	5583	
3339967130	5585	
3339967140	5587	
3339967150	5588	
3339967160	5589	
3339969		PARTS FOR FLUID POWER PUMPS, MOTORS, AND HYDROSTATIC TRANSMISSIONS Hydraulic: Nonaerospace Aerospace Pneumatic: Nonaerospace Aerospace
3339969110	5591	
3339969120	5593	
3339969130	5595	
3339969140	5597	

NOTES: